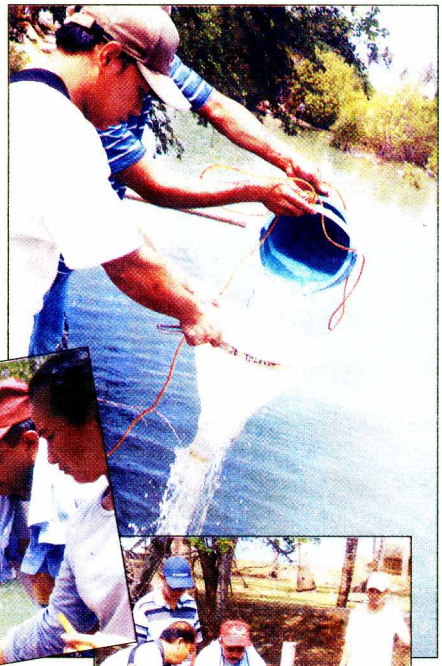
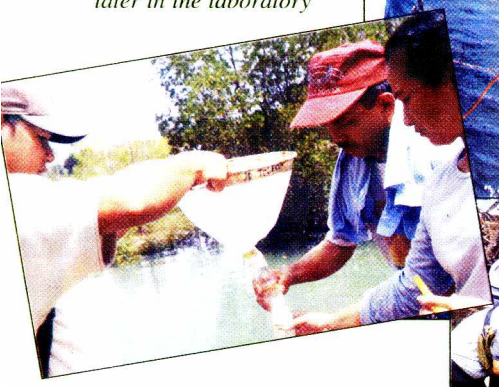
# Live Food: a Lesser Known Essential

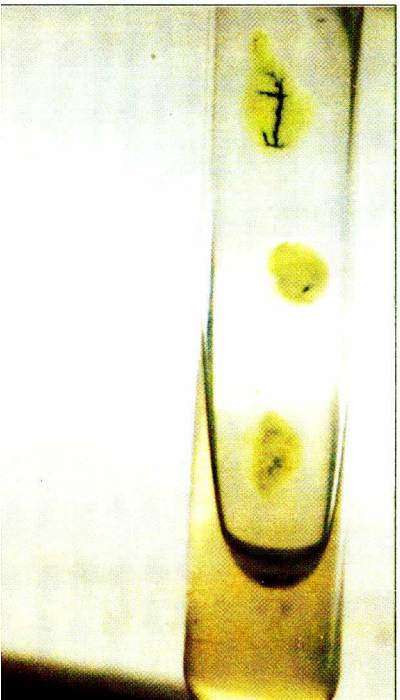
## *SEAFDEC/AQD's live food laboratory is vital to industry growth*

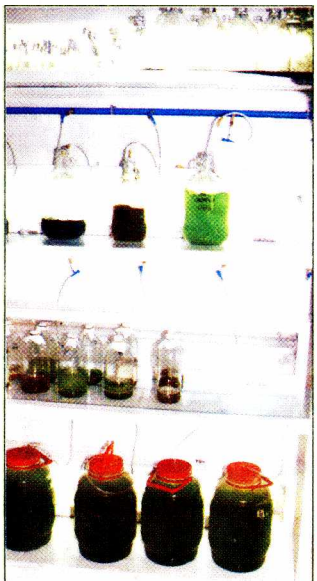




*Live food production is a complicated process in itself. Photos show the collection of microalgae in a pond -- water is strained through a really fine mesh and what is caught in the net is collected in a small bottle to be examined under a microscope later in the laboratory*

*When an algal species has been isolated, it is grown in successively larger containers as the alga increases in number -- for example, from a test tube (this one below contains a colony of* Nannochloropsis *sp.) to flasks, to 1- and 5-liter containers to 1-ton tanks*





There are lesser known areas in the aquaculture production process that, upon closer inspection, prove to be complex operations in themselves. One such area is live food production, an important requirement of a successful hatchery operation as the availability of suitable food can make or break the hatchery run.

Live food, commonly called natural food, are food organisms in the natural habitat of fish. These food organisms include small plants and animals (phytoplankton, zooplankton), and some big ones (aquatic macrophytes). Of the many food species of microalgae that thrive in seawater, only a few can be cultivated successfully in the hatchery because conditions can be environmentally demanding. In ponds, the actual live food for fish are *lablab* which is a complex of blue-green and green algae, diatoms, rotifers, crustaceans, insects, roundworms, detritus, plankton; and *lumut*, which are fibrous, filamentous green algae.

This article is a short discussion of the requirements for live food production in aquaculture and a brief presentation of the processes involved.

**Live food production at SEAFDEC/AQD**

AQD has a live food laboratory that develops techniques for mass production of plankton as food for larvae of fish, crustaceans, and molluscs raised in hatcheries. It maintains a microalgal collection and now has more than 50 local and foreign strains and species. More than 30 others are being studied by researchers and would eventually become a part of the collection.

A visit to the laboratory would take one to heavily airconditioned backrooms with a very small isolation room. Here, a single cell microscopic plant (phytoplankton) is separated and identified from a sampled pond or seawater. The single cell would be grown into colonies in test tubes in either liquid or agar medium (pure culture). A growing colony in a test tube would show microalgal patches clinging to the sides of the test tube. It is then transferred to erlenmeyer flasks where it is allowed to grow further (stock culture).

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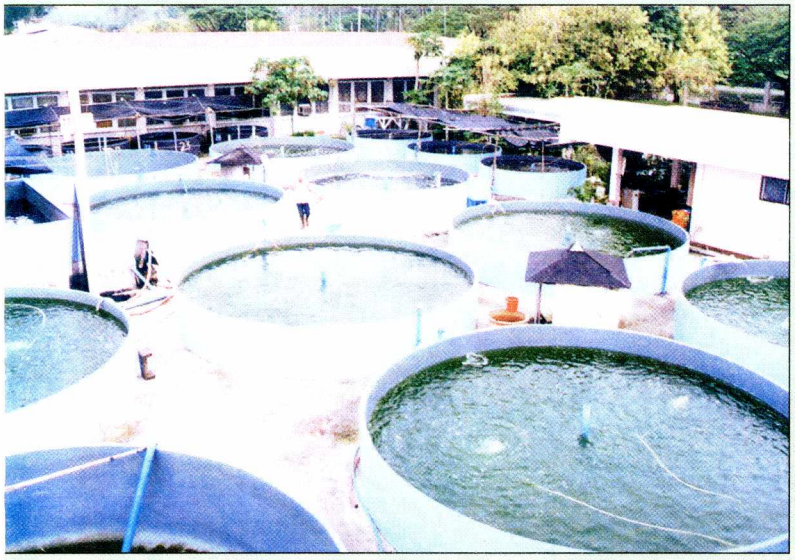
CONTINUED FROM THE BACKCOVER

The bigger rooms contain bigger containers of the microscopic plants (maintenance cultures) that are maintained to be ready for transfer to tanks anytime for researchers at AQD or for sale to buyers for hatchery use.

A few steps from this laboratory is the zooplankton laboratory. Here, copepods, *Artemia* sp., and *Brachionus* sp. undergo more or less the same process as the microscopic plants. Where the plant laboratory showed only containers of aerated brown and green water, this laboratory is more interesting as the macroscopic animals are visible through the glass beakers if one knew what to look for. Copepods are very tiny translucent, almost circular wriggling organisms with feet much resembling lice.

*Concrete tanks of live food at the SEAFDEC/AQD hatcheries in Iloilo*



The following list shows the plankton species cultured at AQD and the corresponding fish that thrive on them in the hatchery or ponds. The density or biomass needed for various stages of the culture animals are prescribed in separate feeding management protocols.

| Phytoplankton species | Hatchery use |
|---|---|
| *Nannochlorum* sp. | All fish and crab larvae |
| *Tetraselmis tetrahele, Isochrysis galbana, Nannochloropsis oculata* | Fish hatchery as food for rotifer; crab hatchery |
| *Skeletonema tropicum* | Shrimp larvae |
| *Chaetoceros calcitrans* | Shrimp larvae |
| *Thalassiosira* sp. | Shrimp larvae |

| Zooplankton species | |
|---|---|
| *Brachionus rotundiformis* | Fish, crab larvae |
| *Acartia* sp. | Grouper larvae; catfish |
| *Pseudodiaptomus annandalei* | Grouper larvae; seabass/catfish |
| *Diaphanosoma celebensis* | Sea bass larvae |

**Industry growth and live food**

Growth of aquaculture depends upon the availability of a ready supply of larvae that can be grown to marketable size. A ready supply of larvae in turn needs quality and sufficient live food to promote rapid growth, provide protection from some diseases, carry natural enzymes that help digest artificial food when fed in combination, and maintains water quality. Fifty percent of feed depends on live food; artificial feed cannot fully replace live food requirements.

But live food production can be very expensive. A 1993 study on the economics of one microalgae production done at AQD reported that equipment was 84% of the total asset cost. The acquisition of equipment specifically for microalgae culture is a major cost incurred in the initial investment. In actual production, the consummables are add-on expenses.

Today, aquaculture producers know that buying starter cultures from big laboratories is convenient. If a buyer still does not know how to grow the microalgae, they get a bonus of a free lecture from AQD. This makes the live food laboratory an indispensable set-up for the industry.

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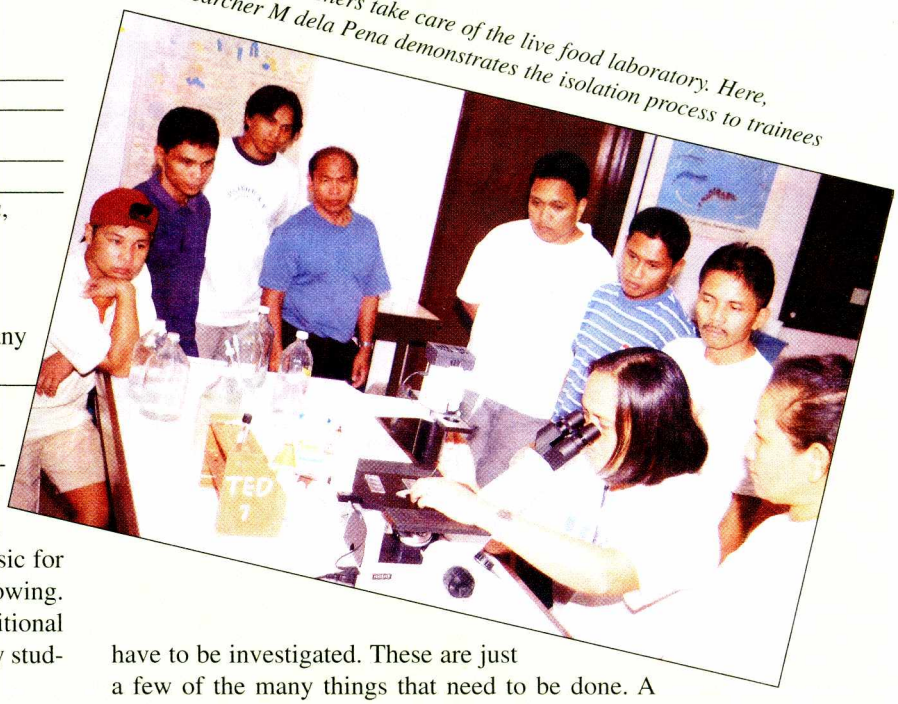
Present prices of algal starters/media are:

| Algae (any species) |
|---|
| P100/liter aerated |
| P 100/test tube unaerated in liquid or solid media |

| Rotifer (*Brachionus*) |
|---|
| P100/million |

| Media/nutrients |
|---|
| P1,170/set for F-medium - for *Isochrysis*, *Skeletonema*, and *Chaetoceros* |
| P700/liter for Conway medium - for *Nannochlorum*, *Tetraselmis*, *Nannochloropsis oculata* |
| P200/set for TMRL medium - for bigger cultures of any species |



*At AQD, researchers take care of the live food laboratory. Here, researcher M dela Pena demonstrates the isolation process to trainees*

**Future activities**

No doubt in the future, live food would become a new market niche along with the other profit-making production components of aquaculture. AQD has never been ready for this than now. The present microalgal collection, considered basic for any growing live food laboratory, has constantly been growing. Indeed, indigenous live food has always been used by traditional aquaculture practitioners but have never been systematically studied.

Taxonomic studies have to confirm the species studied, culture techniques have to be established for newly isolated species and strains, ecological studies such as population dynamics and determination of environmental factors as well as the nutritive value have to be investigated. These are just a few of the many things that need to be done. A bioreactor or fermentor has to be acquired and harvest and storage techniques established. Screening and extraction of bioactive compounds with nutritive and pharmaceutical values are possibilities for the live food industry. - *MBS*

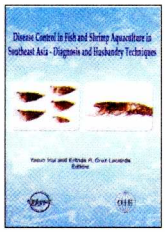
**Endosulfan: a hidden menace by rm coloso**

**ENDOSULFAN ... from page 18**

tion of endosulfan in rice fields. Proceedings from the Rice Research Institute, Department of Agriculture, Meeting No. 5, November 21-23, 2001, Bangkok, Thailand, p 129-139

35 Magallona ED. 1995. Impact of pesticides used in lowland rice production. Selected Papers on Pesticide Management and Regulation in the Philippines (ED Magallona, AC Sumalde, AC Rola, P MacQuarrie), Dalhousie University, Canada and University of the Philippines at Los Banos, Philippines, p 1-45

36 Chatsantiprapa P, Haruthaithanasan P. 2001. Distribution of endosulfan residues in the rivers along paddy field area. Proceedings from the Rice Research Institute, Department of Agriculture, Meeting No. 5, November 21-23, 2001, Bangkok, Thailand, p 141-148 ###



**Disease Control in Fish and Shrimp Aquaculture in SEA - Diagnosis and Husbandry Techniques**, 215 pages, edited by Yasuo Inui and Erlinda Cruz-Lacierda. This volume contains the 14 papers presented at a seminar-workshop held December 4-6, 2001 that was organized by SEAFDEC and the Office International des Epizooties. For a copy, contact Dr Erlinda Cruz-Lacierda at *eclacier@aqd.seafdec.org.ph* or fax (63-33) 5118709, 3351008.

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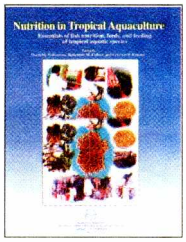

**Nutrition in Tropical Aquaculture** is edited by SEAFDEC/AQD scientists Dr. Oseni Millamena, Dr. Relicardo Coloso, and Dr. Felicitas Pascual. The textbook is the second title released from AQD's textbook writing program. <sales@aqd.seafdec.org.ph>